Pharmacological properties and botanical description of exotic plants growing in northern Iran

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Background: Medicinal plants have been long used as desirable natural sources of various preparations used in traditional herbal therapy worldwide. Since ancient times, traditional remedies have been trusted by Iranian people. Different families of plants can be found in the prescription of rural healers in all regions of Iran. Some of these plants are native to Iran but many others have been known as exotic plants which only grow in special regions worldwide. This study along with our previous study (Mikaili et al., 2013) for the first time illustrates the presence and the growth of several families of these plants in the climate of Iran along with some of their most important pharmacological effects and their active constituents.

INTRODUCTION

The use of phytomedicines in the Iranian traditional medicine has a long history. Since ancient times, rural native-healers and drug sellers in different parts of Iran have used different herbs in their prescriptions that grow in Iran. Here we present 15 exotic medicinal plants that grow in Iran along with some of their important pharmacological properties. The use of these plants in traditional medicine has been proved and their pharmacological properties have been already confirmed in different in vitro studies by many authors. This study illustrates the potential of these plants to be employed as novel medicinal sources for the development of new drugs in Iran and other countries. According to the best of our knowledge, this is the first study that shows the growth of these exotic species in Iran.

MATERIALS AND METHODS

In order to gather the information we traveled to Mazandaran province located in North of Iran and documented images of the exotic species that grow in that region. Proper methodological review of literature was performed and a summary of the most prominent botanical and pharmacological properties of each plant was presented.

Results:

1. Feijoasellowiana (Fig. 1):

Description:

Feijoasellowiana is an evergreen bush widespread in the Southern part of Iran. Accasellowiana, a species of flowering plant in the myrtle family, Myrtaceae, is native to the highlands of southern Brazil, eastern Paraguay, Uruguay, and northern Argentina, and Colombia. It is widely cultivated as a garden plant and fruiting tree in New Zealand, and can be found as a garden plant elsewhere such as in Australia, Azerbaijan, Georgia and South...
Africa. It is an evergreen, perennial shrub or small tree, 1–7 meters (3.3–23 ft.) in height, widely cultivated as a garden plant and fruiting tree.

**Pharmacological effects:**
- Antibacterial activity against some Gram-positive and Gram-negative bacterial strains [23].
- Antioxidant and hepatoprotective activity [27].

Fig. 1:

[2] *Firmianaplatanifolia* (Fig. 2):
**Description:**
Firmiana simplex, commonly known as the Chinese parasol tree or wutong pinyin, is an ornamental plant or tree of the cacao, or chocolate family Sterculiaceae of the order Malvales, native to Asia. It grows to a height of 12 m (40 feet). It has alternate, deciduous leaves up to 30 cm (12 inches) across and small greenish white flowers that are borne in clusters. It is grown as an ornamental in warm regions of North America. Recent publications mention the species as an aggressive and invasive weed in the warmer parts of North America. They urge its removal and give instructions for drastic measures, including destruction of nursery stock. The plant is self-fertile and its seeds spread readily, especially along watercourses, and they germinate and grow rapidly. They compete effectively, smothering many other species [33]. According to an article in the journal *Nature* of 1884, the leaves of Sterculia platani folia were dried for smoking.

**Pharmacological effects:**
- Firmianones A and B exhibited moderate cytotoxicity to the P388 cancer cell line [3].

Fig. 2:

[3] *Fortunella spp.* (Fig. 3):
**Description:**
Kumquats or cumquats are a group of small fruit-bearing trees in the flowering plant family Rutaceae, either forming the genus Fortunella, or placed within Citrussensulato. The edible fruit closely resembles that of
the orange (Citrus sinensis), but it is much smaller and ovular, being approximately the size and shape of an olive. They are slow-growing evergreenshrubs or short trees, from 2.5 to 4.5 meters (8 to 15 ft.) tall, with dense branches, sometimes bearing small thorns. The leaves are dark glossy green, and the flowers white, similar to other citrus flowers, borne singly or clustered in the leaf-axils. Depending on size, the kumquat tree can produce hundreds or even thousands of fruits each year. Seven species of Fortunella have generally been recognized—F. japonica, F. margarita, F. crassifolia, F. hindsii, F. obovata and F. polyandra, as well as the recently described F. bawangica. The Flora of China returns the kumquat to Citrus and combines the species into the single species as Citrus japonica [52].

**Pharmacological effects:**
- Antioxidant activity by DPPH method [22].
- Antiparasitic activity [19].

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**Fig. 3:**

[4] Ginkgoabiloba(Fig. 4):

**Description:**
Ginkgo, also spelled gingko and known as the Maidenhair Tree, is a unique species of tree with no close living relatives. The Ginkgo is a living fossil, as a unique species recognizably similar to fossils dating back 270 million years. Native to China, the tree is widely cultivated and introduced early in human history, and has various uses as a food and in traditional medicine. Ginkgos are large trees, normally reaching a height of 20–35 m (66–115 ft), with some specimens in China being over 50 m (164 feet). The tree has an angular crown and long, somewhat erratic branches, and is usually deep rooted and resistant to wind and snow damage. Young trees are often tall and slender, and sparsely branched; the crown becomes broader as the tree ages. During autumn, the leaves turn a bright yellow, then fall, sometimes within a short space of time (1–15 days). A combination of resistance to disease, insect-resistant wood and the ability to form aerial roots and sprouts makes ginkgos long-lived, with some specimens claimed to be more than 2,500 years old.

**Pharmacological effects:**
- Ginkgo biloba cause to create new bone formation, capillaries and enhance the ratio of inflammatory cells in maxillary sutures. GBE (Ginkgo biloba extract) reduced the elevations of hepatic triglyceride contents [48].
- GBE regenerates the nerve in an experimental facial nerve crush rat model [25]. GBE has shown the protective effects on the lung injury of dogs undergoing hypothermic CPB [12].
Fig. 4:

[5] Grapefruit tangerine (Fig. 5):

Description:
The tangelo (*Citrus × tangelo*), is a citrusfruit, hybrid of tangerine and pomelo or grapefruit. Sometimes referred to as honey bells, tangelos are the size of an adult fist, have a tangerine taste, and are juicy at the expense of flesh. They generally have loose skin and are easier to peel than oranges. Readily distinguished from them by a characteristic “nipple” at the stem. The early maturing Orlando tangelo is noted for its juiciness, mild and sweet flavor, large size, and flat-round shape with a characteristic knob. Most Minneola tangelos are characterized by a stem-end neck, which tends to make the fruit appear bell-shaped. Because of this, it is also called the Honey bell in the gift fruit trade, where it is one of the most popular varieties. The fruit is usually fairly large, typically 9 - 9½ inches in circumference. The peel color, when mature, is a bright-reddish-orange color.

Pharmacological effects:
Abscisic acid (ABA), one of tangelo offshoots, is an important regulator of plant responses to environmental stresses and an absolute requirement for stress tolerance [9]. It has shown the significant antimicrobial and anti-biofilm activity [1].

Fig. 5:

[6] Hibiscus trionum(Fig. 6):

Description:
*Hibiscus trionum*, the Flower-of-an-Hour, is an annual plant that is native to the east of the Mediterranean in the Levant, It has spread throughout southern Europe both as a weed and cultivated as a garden plant. It has been introduced to the United States as an ornamental where it has become naturalized as a weed of cropland and vacant land. The plant grows to a height of 20-50 cm, sometimes as much as 80 cm, and has white or yellow flowers with a purple center.
Pharmacological effects:
We identified iridescence in flowers of *Hibiscus trionum* and *Tulipa* species and demonstrated that iridescence is generated through diffraction gratings that might be widespread among flowering plants [49]. Tillage promoted the germination of other weeds like *Hibiscus trionum* [36].

**Fig. 6:**

[7] *Lagerstroemia indica* (Fig 7):
Description:
*Lagerstroemia indica* (Crape myrtle, Crepe myrtle) is a species in the genus *Lagerstroemia* in the family *Lythraceae*. From China, Korea and Japan, *Lagerstroemia indica* is an often multistemmed, deciduous tree with a wide spreading, flat topped, open habit when mature. The bark is a prominent feature being smooth, pinkish-gray and mottled, shedding each year. Leaves are small and dark green changing to yellow and orange in autumn. Flowers are white, pink, mauve, purple or carmine with crimped petals, in panicles up to 9cm. *Lagerstroemia indica* is frost tolerant, prefers full sun and will grow to 6 meters with a spread of 6 meters.

Pharmacological effects:
The LI (*Lagerstroemia indica* Linn) extract may be used as a valuable agent for treating allergic diseases, such as asthma due to its anti-inflammatory property [51]. The methanol extract of *Lagerstroemia indica* leaves exhibited antimicrobial activity against all pathogenic bacteria and *C. albicans* yeast that were tested such as (*Staphylococcus aureus* (ATCC 8095), *Salmonella enteritides* (ATCC 13076), *Escherichia coli* (ATCC 25922), and *Listeria monocytogenes* (ATCC 15313)) and *Candida albicans* yeast (ATCC 10231) [13].

**Fig. 7:**

[8] *Laurocerasus officinalis* (Fig. 8):
Description:
*Prunus laurocerasus*, also known as cherry laurel, common laurel and sometimes English laurel in North America, is an evergreen species of cherry (*Prunus*), native to regions bordering the Black Sea in southwestern Asia and southeastern Europe, from Albania and Bulgaria east through Turkey to the Caucasus Mountains and northern Iran. Although the common names of *P. laurocerasus* refer to the similarity of foliage and appearance
to bay laurel (*Laurus nobilis*, the true laurel, in the Lauraceae family), the two plants are in fact unrelated, being not only in different genera but also different families (*P. laurocerasus* is in the rose family, Rosaceae) [40]. *Prunus laurocerasus* is an evergreen shrub or small to medium-sized tree, growing to 5–15 meters (16–49 ft) tall, rarely to 18 meters (59 ft.), with a trunk up to 60cm broad. The leaves are dark green, leathery, shiny, (5–)10–25(–30)cm long and 4–10cm broad, with a finely serrated margin. The leaves can have the scent of almonds when crushed. The flower buds appear in early spring and open in early summer in erect 7–15cm racemes of 30–40 flowers, each flower 1cm across, with five creamy-white petals and numerous yellowish stamens. The fruit is a small cherry 1–2cm broad, turning black when ripe in early autumn.

**Pharmacological effects:**
It has shown the antioxidant activity [7]. Anti-inflammatory and anti-nociceptive activity [17]. *L. officinalis* Besides being a good source of nutrients, was found to provide a rich source of protective antioxidant compounds [28]. The experimental data verified that *Laurocerasus officinalis* leaves displayed remarkable anti-inflammatory and ant nociceptive activity [2].

![Image of Magnolia grandiflora](image)

**Fig. 8:**

[9] *Magnolia grandiflora* (Fig. 9):

**Description:**
*Magnolia grandiflora*, commonly known as the southern magnolia or bull bay, is a tree of the family Magnoliaceae native to the southeastern United States, from Virginia south to central Florida, and west to eastern Texas and Oklahoma. Some trees have been seen as far west as New Mexico and California. Reaching 27.5 m (90 ft.) in height, it is a large striking evergreen tree with large dark green leaves and large white fragrant flowers. Widely cultivated around the world, over a hundred cultivars have been bred and marketed commercially. The timber is hard and heavy, and has been used commercially to make furniture, pallets, and veneer. *Magnolia grandiflora* is a medium to large evergreen tree which may grow 27.5 m (90 ft) tall. It typically has a single stem (or trunk) and a pyramidal shape. The leaves are simple and broadly ovate, 12–20 cm (5–8 in) long and 6–12 cm (2–5 in) broad with smooth margins. They are dark green, stiff and leathery, and often scurfy underneath with yellow-brown pubescence. The large, showy, lemoncitronella-scented flowers are white, up to 30 cm (12 in) across and fragrant, with 6–12 petals with a waxy texture, emerging from the tips of twigs on mature trees in late spring. Flowering is followed by the rose-colored fruit, ovoid and 7.5–10 cm (3–4 in) long and 3–5 cm (1.5–2 in) wide.

**Pharmacological effects:**
Anti-inflammatory activities [29]. We demonstrate for the first time that the antiplatelet and anti-thrombotic activities of *magnolol* are modulated by up-regulation of PPAR-β/γ-dependent pathways [43].
Fig. 9:

[10] Magnolia soulangiana(Fig. 10):

Description:
Magnolia × soulangeana (saucer magnolia) is a hybrid plant in the genus Magnolia and family Magnoliaceae. It is a deciduous tree with large, early-blooming flowers in various shades of white, pink, and purple. It is one of the most commonly used magnolias in horticulture, being widely planted in the British Isles, especially in the south of England; and in the United States, especially the east and west coasts. Growing as a multistemmed large shrub or small tree, Magnolia × soulangeana has alternate, simple, shiny, dark green oval-shaped leaves on stout stems. Its flowers emerge dramatically on a bare tree in early spring, with the deciduous leaves expanding shortly thereafter, lasting through summer until autumn. Magnolia × soulangeana flowers are large, commonly 10–20 cm (4–8 in) across, and colored various shades of white, pink, and maroon. An American variety, 'Grace McDade' from Alabama, is reported to bear the largest flowers, with a 35 cm (14 in) diameter, white tinged with pinkish-purple. Magnolia × soulangeana was initially bred by French plantsman Étienne Soulange-Bodin (1774–1846), a retired cavalry officer in Napoleon's army, at his château de Fremont near Paris. He crossed Magnolia denudata with M. liliiflora in 1820, and was impressed with the resulting progeny's first precocious flowering in 1826.

Pharmacological effects:
In a diverse taxonomic range of tree species, including representative species of ancient families of angiosperms (Magnolia × soulangiana Soul.-Bod.) and gymnosperms (Ginkgo biloba L.), oxidase activity was associated with cell walls of developing xylem and was enriched in extracts of cell wall-associated glycoproteins [40]. Magnolia × soulangeana were non hosts or very poor hosts for Parasitism of Woody Ornamentals [4].
Fig. 10:

[11] Meliaazedarach(Fig. 11):

Description:
Meliaazedarach, commonly known as bead-tree or Cape lilac, is a species of deciduous tree in the mahogany family, Meliaceae, that is native to Pakistan, India, Indochina, Southeast Asia and Australia. The genus Melia includes four other species, occurring from southeast of Asia to northern Australia. They are all deciduous or semi-evergreen trees. The adult tree has a rounded crown, and commonly measures attains a height of 7-12 meters, however in exceptional circumstances M. azedarach can attain a height of 45 meters. The flowers are small and fragrant, with five pale purple or lilac petals, growing in clusters. The fruit is a drupe, marble-sized, light yellow at maturity, hanging on the tree all winter, and gradually becoming wrinkled and almost white. Common names of Meliaazedarach include chinaberry, Persian lilac (This name is also used for a lilac hybrid, Syringa × persica). This plant was introduced around 1830 as an ornamental in the United States (South Carolina and Georgia) and widely planted in southern states. Today it is considered an invasive species by some groups as far north as Virginia and Oklahoma.

Pharmacological effects:
Both Jatropha gossypifolia and Melia azedarach senescent leaf extracts (SLEs) are antifeedants to armyworm larvae when present in the food, and also have a synergistic effect with cypermethrin in topical assays. Although the synergistic effect is less than with piperonylbutoxide, both SLEs have some inhibitor activity against detoxification enzymes and acetyl cholinesterase. Thus J. gossypifolia and M. azedarach SLEs may be considered as ecofriendly approaches for the control of Spodoptera frugiperda in order to reduce cypermethrin usage [5]. The Meliaazedarac’s extracts showed higher antibacterial effect against Gram (-) strains (16-32 μg ml⁻¹ of minimal inhibition concentration, MIC), while the leaf extracts were more effective on Candida albicans (32 μg ml⁻¹ of MIC). The particular extracts did not exhibit insecticidal activity and genotoxicity. Total phenol and flavonoid contents of the extracts were determined spectrophotometrically, and the ethyl acetate extract of the leaves was the richest in total flavonoids [38]. Comparing the extracts of the species from the Meliaceae family, Trichilia claussenii showed greater anti-parasite potential in vitro than Meliaazedarach [6]. It has shown anti-inflammatory and antipyretic properties. Meliaazedarach has an anthelmintic effect and by the way it used for worm infestation(PDR, for Herbal Medicines).
[12] **Quercus ilex** (Fig. 12):

**Description:**

*Quercus ilex*, the Holm Oak or Holly Oak is a large evergreen oak native to the Mediterranean region. It takes its name from holm, an ancient name for holly (BBC News (2008)). It is a member of the white oak section of the genus, with acorns that mature in a single summer. It was first introduced to the United Kingdom in the 17th century. The first trees to be planted from acorns in the United Kingdom are still to be found growing within the stately grounds of Mamhead Park, Devon. They are uncommonly fine examples and several of these trees are 3 m (10 ft.) in circumference, at 1 m (3 ft.) from the ground; and one of them measures 4 m (13 ft. 6 in) in circumference. *Quercus ilex* is a medium-size tree 20–27 m tall with finely square-fissured blackish bark and leathery evergreen leaves. The old leaves fall down 1–2 years after new leaves emerge. The leaves are dark green above and pale whitish-grey with dense short hairs below. The leaf shape is variable, the adult leaves are entire, 4–8 cm long and 1–3 cm broad, while those on the lower branches of young trees are often larger (to 10 cm long), and are toothed or somewhat spiny - possibly as protection from grazing animals. In this, the foliage resembles that of the common European Holly *Ilex aquifolium*, and this resemblance has led to its common and botanic names. The name *Ilex* is originally the classical Latin name for the Holm Oak, but was later also used as a botanical genus name for the hollies. The flowers are catkins, produced in the spring; the fruit is an acorn, which matures in about six months. Holm Oak grows in pure stands or mixed forest in relatively arid climates and often at low or moderate elevations. One of the plant associations in which Holm Oak is found is the Holm Oak/Atlas Cedar forests of the Atlas Mountains. In Morocco some of these mixed forests are habitat to the endangered primates, Barbary Macaque, *Macaca sylvanus*.

**Pharmacological effects:**

The *Quercus variabilis* seedlings varied with latitude, and the seedlings had different responses to habitat change [30]. The administration of *Quercus infectoria* (Qi) could effectively eradicate the colonization of Shiga toxin-producing *Escherichia coli* (STEC) O157:H7 in the intestinal tract of mice and prevent renal injury. This compound may be an alternative candidate for a therapeutic agent against infections caused by this dangerous organism [46]. The *Quercus variabilis* has shown antioxidant and anti-nitric oxide components [42].

Fig. 12:

[13] **Morusalbavpendulul(Fig. 13):**

**Description:**

*Morus alba*, known as white mulberry, is a short-lived, fast-growing, small to medium sized mulberry tree, which grows to 10–20 m tall. The species is native to northern China, and is widely cultivated and naturalized elsewhere. It is known as *Tuta* in Sanskrit, *Tuti* in Marathi and *Toot* in Persian language (Farsi), Iran. The white mulberry is widely cultivated to feed the silkworms employed in the commercial production of silk. It is also notable for the rapid release of its pollen, which is launched at over half the speed of sound. On young, vigorous shoots, the leaves may be up to 30 cm long, and deeply and intricately lobed, with the lobes rounded. On older trees, the leaves are generally 5–15 cm long, unlobed, cordate at the base and rounded to acuminate at the tip, and serrated on the margins. The leaves are usually deciduous in winter, but trees grown in tropical regions can be evergreen. The flowers are single-sex catkins; male catkins are 2–3.5 cm long, and female catkins 1–2 cm long. Male and female flowers are usually on separate trees although they may occur on the same tree. The fruit is 1–2.5 cm long; in the species in the wild it is deep purple, but in many cultivated plants it varies from white to
pink; it is sweet but bland, unlike the more intense flavor of the red mulberry and black mulberry. The seeds are widely dispersed by birds, which eat the fruit and excrete the seeds.

**Pharmacological effects:**

It has shown antioxidant activities [35]. Mulberrofuran G and Isomulberrofuran G from *Morus alba L* has had shown anti-hepatitis B Virus activity and Mass Spectrometric Fragmentation [21]. A novel anti-proliferative lectin was purified from *Morus alba L.* (Mulberry) leaves by a two steps chromatographic procedure namely, immobilized metal ion affinity chromatography (IMAC) and convective interaction media (CIM) based anion exchange chromatography [11].

![Fig. 13: Nerium oleander (Fig. 14):](image)

**Description:**

*Nerium oleander* is an evergreen shrub or small tree in the dogbane family Apocynaceae, toxic in all its parts. It is the only species currently classified in the genus *Nerium*. It is most commonly known as oleander, from its superficial resemblance to the unrelated olive *Olea*, but has many other names. It is so widely cultivated that no precise region of origin has been identified, though southwest Asia has been suggested. The ancient city of Volubilis in Morocco took its name from the old Latin name for the flower. Oleander is one of the most poisonous of commonly grown garden plants. Oleander grows to 2–6 m (6.6–20 ft) tall, with erect stems that splay outward as they mature; first-year stems have a glucose bloom, while mature stems have a grayish bark. The leaves are in pairs or whorls of three, thick and leathery, dark-green, narrow lanceolate, 5–21 cm (2.0–8.3 in) long and 1–3.5 cm (0.39–1.4 in) broad, and with an entire margin. The flowers grow in clusters at the end of each branch; they are white, pink to red, 2.5–5 cm (0.98–2.0 in) diameter, with a deeply 5-lobed fringed corolla round the central corolla tube. They are often, but not always, sweet-scented. The fruit is a long narrow capsule 5–23 cm (2.0–9.1 in) long, which splits open at maturity to release numerous downy seeds. *N. oleander* is native or naturalized to a broad area from Mauritania, Morocco, and Portugal eastward through the Mediterranean region and the Sahara (where it is only found sporadically), to the Arabian peninsula, southern Asia, and as far East as Yunnan in southern parts of China. It typically occurs around dry stream beds. *Nerium oleander* is planted in many sub-tropical and tropical areas of the world. On the East Coast of the US, it can be planted as far north as Virginia Beach, Virginia, while in Southern California and Texas it is naturalized as a median strip planting. Oleandrin, one of the toxins present in Oleander Reactions to ingestion of this plant can include both gastrointestinal and cardiac effects. The gastrointestinal effects can consist of nausea and vomiting, excess salivation, abdominal pain, diarrhea that may or may not contain blood, and especially in horses, colic. The evergreen plant can be tree or shrub-like. The trunks are up to 4 m high. The leaves are 6 to 12 by 1.2 to 2 cm, linear-lanceolate, sharp-edged, coriaceous, dark green. The leaves are the medicinal part of the plant. NeriumoleanJer grows mainly in the Mediterranean region but also in parts of Asia. It is cultivated in Europe (PDR, for Herbal Medicines).Cardiac reactions consist of irregular heart rate, sometimes characterized by a racing heart at first that then slows to below normal further along in the reaction. The heart may also beat erratically with no sign of a specific rhythm. Extremities may become pale and cold due to poor or irregular circulation. Reactions to poisonings from this plant can also affect the central nervous system. These symptoms can include drowsiness, tremors or shaking of the muscles, seizures, collapse, and even coma that can lead to death. Oleander sap can cause skin irritations, severe eye inflammation and irritation, and allergic reactions characterized by dermatitis.
Pharmacological effects:

Treatment of diabetic rats with glimepiride or *Nerium oleander* extract also improved liver enzymes activities (anti-diabetic activity) [34]. The study indicates that the hydro alcoholic extract of *Nerium oleander* Linn flowers aid in cardio-protection probably by improving the antioxidant defense system during experimental myocardial necrosis [20]. It has shown Hepatoprotective and antioxidant activity of methanolic extract against CCl4-induced liver injury in rats [44]. Meanwhile it has shown Molluscicidal activity of cardiac glycosides against *Pomacea canaliculata* and its implications for the mechanisms of toxicity [10].

![Image](image1.png)

**Fig. 14:**

**[15] Parrotiapersica (Fig. 15):**

**Description:**

*Parrotiapersica* (Persian Ironwood Tree), is a deciduous tree in the family Hamamelidaceae, the sole species in the genus *Parrotia* but closely related to the genus *Hamamelis* (Witch-hazels). It is native to northern Iran, where it is endemic in the Alborz mountains. It grows to 30 m tall and 8-15 m broad, with a trunk up to 150 cm diameter. The bark is smooth, pinkish-brown flaking/peeling to leave cinnamon, pink, green, and pale yellow patches in a similar manner to plant trees. The leaves are alternate, ovoid, often slightly lop-sided, 6-15 cm long and 4-10 cm across, with a wavy margin; they are glossy green, turning a rich purple to brilliant red in autumn colors. The flowers are somewhat similar to Witch-hazel flowers but dark red; they are likewise produced in late winter on bare stems, but differ in having only four rounded sepals with no petals; the stamens are however fairly conspicuous, forming a dense red cluster 3-4 mm across. The fruit is a two-parted capsule containing two seeds, one in each half.

**Pharmacological effects:**

Histo-pathological studies have shown that pretreatment with the ethanolic extract of the roots of *apersica* reduces (100%) ethanol- and pylorus ligation-induced hemorrhagic necrosis in rats [45]. *Parrotiapersica* has shownestrogenic activities [41].

![Image](image2.png)

**Fig. 15:**
[16] Persea americana (Fig. 16):

Description:

The avocado (Persea americana) is a tree native to Central Mexico, classified in the flowering plant family Lauraceae along with cinnamon, camphor and bay laurel. Avocado or alligator pear also refers to the fruit (botanically a large berry that contains a single seed) of the tree. Avocados are commercially valuable and are cultivated in tropical and Mediterranean climates throughout the world (California Avocado Society). They have a green-skinned, fleshy body that may be pear-shaped, egg-shaped, or spherical, and ripens after harvesting. Trees are partially self-pollinating and often are propagated through grafting to maintain a predictable quality and quantity of the fruit. Native "criollo" avocados, the ancestral form of today's domesticated varieties P. americana, or the avocado, originated in the state of Puebla, Mexico. The native, undomesticated variety is known as a criollo, and is small, with dark black skin, and contains a large seed. The oldest evidence of avocado use was found in a cave located in Coxcatlán, Puebla, Mexico, that dates to around 10,000 BC. The avocado tree also has a long history of cultivation in Central and South America; a water jar shaped like an avocado, dating to AD 900, was discovered in the pre-Incan city of Chan. The medicinal parts are the dried leaves, die fresh leaves, the whole fruit including the seed and the oil extracted from the leaves. The flowers are in compact or loose racemes. They are 5 to 8.2 mm long and greenish. The inner and outer perianth circles are 4 to 6 mm long and elliptical to oval-elliptical. The anthers are 3.5 mm long, and the filaments are 2.3 mm. The ovary is oval or pear-shaped and downy. It develops into a drupe, which is green and fleshy and up to 18 cm long. The drupe is smooth with thick oily flesh and a very large seed. The avocado is a tree up to 40 m in height and with a trunk 60 cm in diameter. The leaves are 6 to 30 cm long and 3.5 to 19 cm wide. They are narrow to broadly elliptical. The leaf surface is sticky, while the lower surface is downy. The plant originated in central and southern South America and is cultivated in all tropical and subtropical regions today. Avocado oil comes from the fruit of Persea americana. Avocado oil is recovered from the pericarp of Persea americana and refined if necessary (PDR, for Herbal Medicines). Avocados were known by the Aztecs as 'the fertility fruit'. In some countries of South America, such as Argentina, Bolivia, Chile, Peru, and Uruguay, the avocado is known by its Quechua name, palta. In other Spanish-speaking countries it is known by the Mexican name and in Portuguese it is abacate. The fruit is sometimes called an avocado pear or alligator pear (due to its shape and the rough green skin of some cultivars). The Nahuatl ahuacatl can be compounded with other words, as in ahuacamolli, meaning avocado soup or sauce, from which the Spanish word guacamole derives.

Pharmacological effects:

The results indicate that the hydro-alcoholic extract of the leaves of Persea americana has anti-diabetic properties and possibly acts to regulate glucose uptake in liver and muscles, by way of PKB/Akt activation, restoring the intracellular energy balance [31]. SFE (supercritical fluid extraction) and microwave extraction of Persea americana Mill which produced the best quality oil, better than traditional Soxhlet extraction, with the least amount of oxidizing metals present [39].

Fig. 16:

[17] Phoenix dactylifera (Fig. 17):

Description:

The date palm (Phoenix dactylifera) is a palm in the genus Phoenix, cultivated for its edible sweet fruit. Although its place of origin is unknown because of long cultivation, it probably originated from lands around the Persian Gulf. It is a medium-sized plant, 15–25 m tall, growing singly or forming a clump with several stems from a single root system. The leaves are 4–6 m long, with spines on the petiole, and pinnate, with about 150
leaflets; the leaflets are 30 cm long and 2 cm wide. The full spans of the crown ranges from 6 to 10 m. Dates contain 20-70 calories each, depending on size and species. Dates are an important traditional crop in Iraq, Arabia, and North Africa west to Morocco and are mentioned more than 50 times in the Bible. In Islamic culture, dates and yogurt or milk are traditionally the first foods consumed for Iftar after the sun has set during Ramadan. Dates (especially Medjool and Deglet Noor) are also cultivated in southern California, Arizona and southern Florida in the United States. Date palms can take 4 to 8 years after planting before they will bear fruit, and produce viable yields for commercial harvest between 7 to 10 years. Mature date palms can produce 80–120 kilograms (176–264 lb.) of dates per harvest season, although they do not all ripen at the same time so several harvests are required. In order to get fruit of marketable quality, the bunches of dates must be thinned and bagged or covered before ripening so that the remaining fruits grow larger and are protected from weather and pests such as birds.

**Pharmacological effects:**

DPP (date palm pollen (*Phoenix dactylifera*)) may have a potential protective effect in APH (Atypical prostatic hyperplasia) -induced Wistar rats through modulation of cytokine expression and/or up-regulation of their autocrine/paracrine receptors and by the way this plant has shown anti-inflammatory and antiproliferative activities [15]. The potential role of *Phoenix dactylifera* on Eimeriapapillata-induced infection in mice [32]. Therapeutic effects of date palm (*Phoenix dactylifera L.*) pollen extract on cadmium-induced testicular toxicity [16].

![Image](image_url)

**Fig. 17:**

[18] *Platycladusorientalis*(Fig. 18):

**Description:**

*Platycladus* is a distinct genus of evergreen coniferous tree in the cypress family Cupressaceae, containing only one species, *Platycladusorientalis*, also known as Chinese Arborvitaee or Biota. It is endemic to Northwestern China. It is also now naturalized as an introduced species elsewhere in Asia: eastward to Korea and Japan; southward to northern India; and westward to northern Iran. Although generally accepted as only member of its genus, it has been suggested that the closely related species *Microbiotadecussata* could be included in *Platycladus*, but this is not widely followed. Other fairly close relatives are the genera *Juniperus* and *Cupressus*, both of these genera being graft-compatible with *Platycladus*. In older texts, *Platycladus* was often included in *Thuja*, but it is only distantly related to that genus. Differences from *Thuja* include its distinct cones, wingless seeds, and it is almost scentless foliage. It is a small, slow-growing tree, to 15-20 m tall and 0.5 m trunk diameter (exceptionally to 30 m tall and 2 m diameter in very old trees). The foliage forms in flat sprays with scale-like leaves 2-4 mm long. The cones are 15-25 mm long, green ripening brown in about 8 months from pollination, and have 6-12 thick scales arranged in opposite pairs. The seeds are 4-6 mm long, with no wing. It is very widely used as an ornamental tree, both in its homeland, where it is associated with long life and vitality, and very widely elsewhere in temperate climates. Several cultivars have been selected, of which ‘AureananaandElegantissima have gained the Royal Horticultural Society’s Award of Garden Merit. The wood is used in Buddhist temples; both for construction work, and chipped, for incense burning (Cirrus Digital).
Pharmacological effects:

Based on these results, CLO (cedar leaf \textit{Thujaplicata} oil) shows promise as a prospective safe, green, broad-spectrum anti-microbial agent for decontamination of buildings [24]. It has shown the significant Protective effect of against DMBA-induced breast cancer with reference to oxidative stresses [37]. Our findings implied that lambertianic acid from \textit{Thujaorientalis} in mouse bone marrow may possess the potential in the treatment of allergy [8]. The anti-inflammatory activities of an extract and compounds isolated from \textit{Platycladusorientalis} (Linnaeus) Franco [18].

![Populus deltoides](image)

\textit{Populus deltoides}, the eastern cottonwood, is a cottonwood-poplar native to North America, growing throughout the eastern, central, and southwestern United States, the southernmost part of eastern Canada, and northeastern Mexico. \textit{Populus deltoides} is a large tree growing to 20–40 meters (67–130 feet) tall and with a trunk up to 1.8 meters (5.9 ft.) diameter, one of the largest North American hardwood trees. The bark is silvery-white, smooth or lightly fissured when young, becoming dark gray and deeply fissured on old trees. The twigs are grayish-yellow, stout, with large triangular leaf scars. The winter buds are slender, pointed, 1–2 cm long (.039–.79 inches), yellowish brown, and resinous. The leaves are large, deltoid (triangular), 4–10 cm (1.6–3.9 inches) long and 4–11 cm (1.6–4.3 inches) broad with a truncated (flattened) base and a petiole 3–12 cm (1.2–4.7 inches) long. The leaf is very coarsely toothed, the teeth are curved and gland tipped, and the petiole is flat; they are dark green in the summer and turn yellow in the fall (but many cottonwoods in dry locations drop their leaves early from the combination of drought and leaf rust, making their fall color dull or absent). Due to the flat stem of the leaf, the leaf has the tendency to shake from even the slightest breeze. This is one of the identifying characteristics. It is dioeciously, with the flowers (catkins) produced on single-sex trees in early spring. The male (pollen) catkins are reddish-purple, 8–10 cm (2.1–3.9 inches) long; the female catkins are green, 7–13 cm (2.8–5.1 inches) long at pollination, maturing 15–20 cm (6.9–7.9 inches) long with several 6–15 mm (0.24–0.59 inches) seed capsules in early summer, which split open to release the numerous small seeds attached to cotton-like strands [14].
Pharmacological effects:

Our finding has shown that salt-alkali condition with salinity >200 mmol L(-1) and pH > 8.99 was not appropriate to the growth of *Qingshan poplar* (*Populus* pseudo-cathayana *x* *P. deltoides*) [50]. Another search has shown that the inoculation of strain D14 could contribute to the increase in the as (arsenic) tolerance of *Populasdeltoides*, promotion of the growth, increase in the uptake efficiency and enhancement of as translocation [47]. The founded obtained the provided promising baseline information for the potential use of the extract and flavonoids from *Populasdeltoides* as antimicrobial agents to help control plant diseases [52].

**Fig. 19:**

Conclusion:

These data all together show that the mentioned species possess important pharmacological effects of the current interest in pharmaceutical sciences. Since they can grow in the climate of Iran, they have the potential to be further studied and be employed for their various medicinal and pharmacological properties in Iran and elsewhere.

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**REFERENCES**


